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STRUCTURAL CHANGE IN THE OIL INDUSTRY AND ITS IMPACT ON THE GULF COAST ECONOMY

A REPORT

PREPARED FOR THE USE OF THE

SUBCOMMITTEE ON ECONOMIC GOALS AND INTERGOVERNMENTAL POLICY

OF THE

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

AUGUST 30, 1985

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LETTERS OF TRANSMITTAL

AUGUST 27, 1985.

To the Members of the Joint Economic Committee:

I am transmitting for the use of the Joint Economic Committee and the interested public, a research paper assessing the structural changes affecting the domestic oil industry and how those changes are influencing the Gulf Coast region of the United States. This report is entitled "Structural Change in the Oil Industry and Its Impact on the Gulf Coast Economy."

We are grateful to Dr. Bernard Weinstein, assistant director for research and policy; Dr. Don Hoyte and Dr. Harold Gross, research scientists; and Mr. Art Adamson, institute associate and previously manager of a chemical plant, who are employees of the John Gray Institute. Dr. John Rees is a professor of geography, Syracuse University, and an established scholar in industrial geography and public policy.

The project was supervised for the Joint Economic Committee by George R. Tyler.

The views contained in this report are not necessarily those of the Joint Economic Committee or of individual members.

Sincerely,

DAVID R. OBEY,
Chairman, Joint Economic Committee.

AUGUST 21, 1985.

Hon. DAVID R. OBEY,
Chairman, Joint Economic Committee, Congress of the United States, Washington, DC.

DEAR MR. CHAIRMAN: Transmitted herewith is a report of the fundamental changes influencing the domestic oil industry and their impact on the Gulf Coast region of Texas and Louisiana. The report was prepared by Dr. Bernard Weinstein and associates at the John Gray Institute, Lamar University, Beaumont, TX, an institution deeply involved in identifying economic forces in the Gulf Coast.

The report outlines the severe foreign pressures which have debilitated the critical oil industry in recent years and spells out in detail their effects in Texas and Louisiana. It is an important contribution to the literature and a valuable aid to Congress in its efforts to maintain a viable and robust domestic energy sector.

Views expressed in the report are those of the authors and do not necessarily represent the views of their organization or of the subcommittee.

We hope that this report will be useful to the full committee.

Sincerely,

LLOYD BENTSEN,
Vice Chairman, Subcommittee on Economic Goals and Intergovernmental Policy.

PREFACE

This report on changes in the oil industry and the impact on the Gulf Coast was prepared at the request of the Joint Economic Committee of the U.S. Congress. The material is based on prior work at the John Gray Institute by the authors. By summarizing current trends in the upstream and downstream segments of the oil business, a clear pattern of worldwide oil industry adjustment emerges that helps explain local changes in capacity and employment. These changes are large enough to generate severe regional unemployment and a ripple in the local and state economies that affect housing, wholesale and retail trade, as well as other manufacturing and construction that serve the oil and gas industry.

Dr. Bernard Weinstein, assistant director for research and policy; Dr. Don Hoyte and Dr. Harold Gross, research scientists; and Mr. Art Adamson, institute associate and previously manager of a chemical plant, are employees of the John Gray Institute. Dr. John Rees is a professor of geography, Syracuse University, and an established scholar in industrial geography and public policy.

The authors and the Institute welcome any views or comments prompted by this report.

PHILLIP L. JOHNSON, PH.D.,
Executive Director, John Gray Institute.

CONTENTS

	Page
Letters of Transmittal	III
Preface	V
I. Executive Summary	1
II. Recent Developments in Refining and Related Industries	4
III. The Underlying Causes of Structural Adjustment in the Domestic Oil Industry	23
IV. Employment Consequences From the Restructuring of the Oil Industry	26
V. Oil Refining and the Outlook for the Gulf Coast Economy	33

TABLES

1. Mergers Create a New Lineup in the U.S. Oil Industry	5
2. Largest Mergers and Acquisitions in 1984	7
3. Changes in U.S. Refineries by State, 1975–80	8
4. Changes in U.S. Refineries by State, 1980 through 1984	9
5. Inactive Refineries, as of January 1, 1985	9
6. Refinery Shutdowns by PAD District and Size, 1975–79	10
7. Refinery Shutdowns by PAD District and Size, 1980 through 1984	11
8. Restructuring in the Texas Gulf Coast Petrochemical Sectors, 1979–84	12
9. Employment Data, Gulf Coast MSA's	26
10. Employment Trends in the Golden Triangle	27
11. Actual Unemployment Statistics, Percent	31

FIGURES

1. Petroleum Administration for Defense (PAD) Districts	13
2. World Rotary Rig Count and U.S. Real Value of Oilfield Equipment Production, 1976–84	15
3. Real Value of Oilfield Equipment Exports Per Operating Foreign Rotary Drilling Rig, 1978–84	17
4. Cumulative Number of Foreign Oilfield Equipment Manufacturers by Year of Firm Founding	19
5. Apparent U.S. Domestic Consumption of Oilfield Equipment and Operating U.S. Rotary Drilling Rigs, 1977–84	21

STRUCTURAL CHANGE IN THE OIL INDUSTRY AND ITS IMPACT ON THE GULF COAST ECONOMY

By Bernard L. Weinstein, Ph.D., Donald R. Hoyte, Ph.D., N.A. Adamson, P.E., Harold T. Gross, Ph.D., and John Rees, Ph.D.

I. EXECUTIVE SUMMARY

During the 1970's, the oil patch, and especially the Texas-Louisiana Gulf Coast Cresent, experienced an unprecedented economic boom. Driven by constantly rising prices for oil and gas, the regional economy posted extremely rapid employment and income gains as a result of increased exploration and drilling activity, the manufacture of oil field equipment, expansions at refineries and chemical plants and the relocation of energy company offices to the Gulf Coast.

For the past three years, by contract, the Gulf Coast economy has been in a tailspin. Job growth has slowed markedly in all of the region's metropolitan areas, and unemployment rates, for the most part, remain well above the U.S. average despite two and a half years of national economic recovery and expansion. Most significantly, *every metropolitan area along the Gulf Coast has experienced large declines in manufacturing employment since 1980,* with losses ranging from 4.8 percent in Lafayette to 33.3 percent in Lake Charles.

Oil refining has been one of the hardest hit industries along the Gulf Coast. Of the 106 U.S. refineries that have shut down since 1980, 37 are in Texas and Louisiana. Nationally, crude oil refining capacity has dropped from 17.8 million B/CD to 15.1 B/CD since 1980, with 32 percent of that reduction occurring in Texas and Louisiana.

Perhaps the most dramatic recent cutback was the layoff of over 1,200 workers, supervisors and managers at Texaco's huge Port Arthur refinery, about 40 percent of its employment base. This layoff was in addition to nearly 2,000 jobs that had been lost through attrition and layoffs over the previous three years. Formerly rated at 402,000 barrels per calendar day of capacity, the streamlined operation is now rated at only 200,000 barrels per calendar day.

Because refinery workers receive high wages, reductions in force have serious local economic consequences. The John Gray Institute has estimated that at least $100 million of purchasing power will disappear from the Goldern Triangle (Beaumont-Port Arthur) economy this year as a result of Texaco's reduction in force, and because of the strong linkages between refining and other industries

and services, additional income and employment will be lost across the state of Texas and elsewhere.

The contraction of the U.S. refining industry has resulted from a number of factors. Anticipation of continually rising prices and demand for gasoline, combined with incentives offered by national energy policies, led to a 20 percent increase in domestic refining capacity between 1975 and 1980, with most of the expansion occurring in California, Texas and Louisiana. Just as this new capacity came on stream, prices and demand for gasoline and other distillates began to drop. Consequently, oil refining has become a marginally profitable business at best. Indeed, a recent survey by *Platts Oilgram* found that the "best"profit margin among Houston-area refiners was a 64 cents per barrel loss. The worst margin was a per barrel loss of $4.61.

Though capacity nationwide has been reduced by nearly 2.7 million barrels per calendar day since 1980, the 191 active refineries are currently operating at only 75 percent of rated capacity. With most of the small refineries already out of business or up for sale, the oil companies must now look at their larger units for further reductions in capacity to bring supply and demand more closely into balance.

Other factors point to a continued decline in the refining industry and additional problems for the Gulf Coast economy:

- Recent mergers and acquisitions among the big oil companies are being accompanied by the disposition of refinery assets, either to satisfy legal requirements or to raise cash to reduce debt burdens.
- It is becoming cheaper to buy refined products abroad than to manufacture them domestically. Over the past year imports have climbed nearly 50 percent and now account for 10 percent of total domestic gasoline consumption. Imports have been encouraged both by the strong dollar and by excess capacity in European and Caribbean refineries.
- OPEC and the other oil exporting nations are spending billions on new, state-of-the-art refineries and petrochemical plants that, because of artificially low crude oil and feedstock costs, will be able to undersell U.S. producers.
- Because refineries located abroad are usually not subject to the stringent environmental standards imposed on domestic processing, a further wedge is being driven between U.S. and foreign production costs.

The U.S. refining industry is not going out of business, but it is changing its product mix and its modus operandi. In the future, emphasis will be placed on products with a higher value-added than gasoline, such as lubricating base oils and petrochemical feedstocks. This product realignment will be accompanied by new investments in process-control technology, automation and energy conservation. As a result, the refineries of tomorrow will be manned with many fewer employees than the refineries of today.

Over the past three years, employment in refining nationwide has dropped over 13 percent, 173,000 to 150,000. By the end of the century, the industry will probably employ fewer than 100,000 workers. The implication of these trends for Gulf Coast communities heavily dependent on the petrochemical sector should be crystal clear. Industrial diversification has become an imperative for economic survival.

II. RECENT DEVELOPMENTS IN REFINING AND RELATED INDUSTRIES

After enjoying healthy growth during the 1970's, the refining and petrochemical industries have entered a period of significant retrenchment. Related industries—such as rig fabrication, work boats, drilling equipment and offshore services—have also witnessed substantial reductions of employment in recent years.

A. Merger and Acquisition Activity in the Oil Industry

There has been a wave of mega-mergers in the oil industry since 1980. Table 1 shows how the three largest mergers of Texaco-Getty, Chevron-Gulf and Mobil-Superior create a new line-up in the American oil industry in terms of revenues, reserves, production and spending. Before considering recent events in some detail, these trends will be placed in historical context.

It is generally agreed that the American economy has experienced *three major waves of mergers* during this century, the first one taking place between 1895 and 1905, the second in 1920–33, while the third wave of mergers which started around 1950 is still with us. The first two waves were smaller than the current one and involved more horizontal mergers. The current merger wave has been dominated until recently by mergers of a conglomerate nature across conventional market lines, though a resurgence of horizontal mergers has occurred since 1980.

The petroleum industry, long a symbol of bigness and power in American industry, has had a considerable amount of merger activity. Among the 25 most merger-active firms identified by the Federal Trade Commission (FTC) between 1961 and 1968, eight were large petroleum companies. Those eight companies acquired more than $6 billion of assets in this short but explosive period, and they were second only to the 11 conglomerates that dominated merger activity during that time. Hence, the recent wave of mega-mergers is not without precedent in this industry. Since the United States had the smallest percentage gain in refining capacity of any region in the world during the 1961–72 period, this lack of domestic refining capacity has been seen as a major cause of the fuel oil and gasoline shortages of the mid 1970's. In retrospect, given the current overcapacity in refining, this low rate of growth may seem more appropriate and not an over reaction to short run demand.

Increasing firm size has been another motive for merger. While the domestic petroleum refining capacity of the merger active group was only two percent between 1961 and 1972 when adjusted for merger activity, this cannot be seen as a negative effect from the industry perspective in 1984.

While the large mergers of the last two years offer new economies of scale for the industry that make refineries of the merged

companies more profitable and exploration efforts potentially more productive, Table 1 shows no drastic changes in the rankings of the largest oil companies.

TABLE 1.—*Mergers Create a New Lineup in the U.S. Oil Industry*

[Data for 1983]

Revenues:	*Billions*
Exxon	$94.7
Mobil + Superior	60.8
Mobil	59.0
Chevron + Gulf	58.1
Texaco + Getty	53.2
Texaco	41.1
Std. Oil (Ind.)	29.5
Chevron	29.2
Gulf	28.9
Arco	26.3
Shell	19.9
Sun	15.5
Phillips	15.4
U.S. oil revenues:	*Liquid, billions of barrels*
Sohio	2.82
Exxon	2.78
Arco	2.57
Shell	2.17
Texaco + Getty	2.16
Chevron + Gulf	1.97
Std. Oil (Ind.)	1.71
Chevron	1.18
Mobil + Superior	1.04
Texaco	0.97
Mobil	0.86
Gulf	0.79
Unocal	0.66
U.S. liquids production:	*Billions of barrels*
Exxon	0.28
Arco	0.24
Texaco + Getty	0.23
Chevron + Gulf	0.22
Sohio	0.22
Shell	0.19
Std. Oil (Ind.)	0.15
Texaco	0.12
Chevron	0.12
Getty	0.10
Mobil	0.10
Gulf	0.10
Capital and exploration spending:	*Billions*
Exxon	$9.0
Chevron + Gulf	5.8
Texaco + Getty	5.1
Mobil + Superior	4.9
Std. Oil (Ind.)	4.1
Texaco	3.8
Mobil	3.8
Arco	3.4
Chevron	3.1
Shell	2.8
Gulf	2.8
Sohio	2.3
Unocal	1.8
Conoco	1.7

Source: Oil and Gas Journal, September 10, 1984.

In several important ways, however, industry experts see the mergers as adding new opportunities for increased efficiencies. Perhaps most important in this regard, the combinations should enable Mobil, Chevron, and Texaco to develop new exploration strategies with better potential for success.

To avoid anti-trust problems and to make the best use of their enlarged marketing power, the newly merged companies are expected to sell or close many of their newly acquired service stations, as well as several refineries. Advocates of economic efficiency see this as a restructuring process that will enhance the profitability of the American oil industry which is faced with an oil glut on the world market and intense international competition from other producing countries like Saudi Arabia and Kuwait, which have been upgrading their indigenous industries since the first OPEC price shock of 1973. Because of a large surplus of refining capacity across the country and around the world and because profit *margins* in *refining* itself tend to be narrow, industry experts expect Texaco and Chevron to dispose of more of their newly acquired refineries than is required by the Federal Trade Commission. Because *utilization rates* of refineries are crucial to their profitability, such streamlining can only enhance profitability.

The country's refineries are currently running at about 75 percent of capacity, reflecting a continuing overcapacity in the industry. The oil price increases of OPEC I (1973) and OPEC II (the more gradual increase since 1979) together with increased fuel efficiency in automobiles and other conservation measures have meant a relative decrease in the demand for gasoline. Hence the rationalizing implications of the oil mergers loom large.

Buyers of surplus refineries and service stations may be hard to find. According to the *New York Times*, Texaco, which has agreed to sell 600 Getty-owned stations in the Northeast, has to date been unable to find buyers for a Getty refinery in Kansas and 2,300 other Getty stations in 15 states. Chevron is being required by the FTC to spin-off about 4,000 Gulf service stations in six Southeastern states (Kentucky, Tennessee, Alabama, Mississippi, Louisiana, and Florida), and has already sold a large Gulf refinery. Meanwhile, the number of service stations in the United States has been declining steadily for six years, from 263,000 in 1977 to 209,000 at the end of 1983.

While the oil industry may be unique in the size of the mergers involved, it is certainly not the only sector to experience such mergers. A glance at Table 2 shows that during 1984 a number of large acquisitions also involved food, automobiles, electronics, steel, aircraft, and financial service companies. Indeed, further acquisition can be jutified in the petroleum refining industry because the concentration ratios (i.e., the percent of shipments accounted for by the largest manufacturing companies) were relatively small compared to many other sectors: motor vehicles, steel, aircraft, photography, and electronic computing equipment among others.

TABLE 2.—LARGEST MERGERS AND ACQUISITIONS IN 1984

Target company	Acquiring company	Estimated acquisition value (millions)	Status
Gulf	Chevron	$13,300	Completed
Getty Oil	Texaco	10,125	Do
Superior Oil	Mobil	5,700	Pending
Shell Oil	Royal Dutch/Shell	5,500	Do
Continental Group	Kiewit Murdock Group	2,700	Do
Esmark	Beatrice Foods	2,700	Do
Electronic Data Systems	General Motors	2,500	Do
Utah International	Broken Hill Proprietary	2,400	Completed
CIT Financial	Manufacturers Hanover	1,500	Do
Gulf United Insurance	American General	1,200	Do
Jewel Cos	American Stores	1,150	Pending
A.C. Nielsen	Dun & Bradstreet	1,082	Do
Employers Reinsurance	General Electric	1,075	Do
Lifemark Corporation	American Medical Int'l	863	Completed
I.D.S.	American Express	775	Do
Dun & Bradstreet TV	A.H. Belo	605	Do
Family Financial Service	PSFS	600	Do
Chicago, Milwaukee R.R.	Canadian Pacific	571	Pending
Mesa Royalty Trust	Mesa Petroleum	571	Do
Husky Oil-American	U.S. Steel	505	Completed
CooperVision	Nestle S.A.	500	Pending
U.S. Industries	Hanson Trust	488	Completed
Hughes Helicopters	McDonnell Douglas Corp.	470	Do
Walter E. Heller Int'l	Fuji Bank	425	Do
Felmont Oil	Homestake Mining	404	Pending
Dowell U.S.A.	Schlumberger Ltd.	400	Completed
Granger Associates	Digital Switch	400	Pending
Dorchester Gas	Damson Oil	392	Completed

Source: New York Times, July 8, 1984

The raison d'etre for these mega-mergers in the oil industry then can be attributed to *overcapacity*. On the one hand, companies are trying to get access to lower cost reserves, while on the other hand excess capacity implies that there has to be some rationalization in the industry.

B. Changes in Refining Capacity: 1975–80 and 1980–84

Whereas restructuring has recently become a euphemism for saying that an industry is shrinking, it is often forgotten that an economy is continuously changing as it grows. What tends to happen is that policy makers and the media give far more attention to the impact of restructuring under conditions of decline or stagnation than they do under conditions of growth. This is particularly true of the oil industry today.

In the great economist Joseph Schumpeter's words, mergers are part of the "process of creative destruction" as an industry evolves along a life cycle of growth and change. The fact that the 1980's heralded a new era in the life cycle of the petroleum industry, an era very different from the growth phase of the 1970's, manifests itself in refinery shutdowns and increasing idle capacity as well as in the recent spate of acquisitions and mergers.

Changes in the capacity of U.S. refineries are shown by state for the periods 1975–80 and 1980–84 in Tables 3 and 4. These tables reveal a relatively complex and active picture as well as one that

changes dramatically between the two time periods. The 1975–80 period saw an increase of 38 refineries in the U.S. as a whole, with 11 of these located in Texas and another 11 in Louisiana. The U.S. as a whole increased refining capacity by nearly three million barrels per calendar year, with 32 percent of this occurring in Texas alone. The 1980–84 period shows a contrasting picture (Table 4), with 106 refineries closing across the country, 23 of these in Texas and another 14 in Louisiana.

TABLE 3.—CHANGES IN U.S. REFINERIES BY STATE, 1975–80

	Number of refineries, 1975	Change in number, 1975–80	Crude capacity, B/CD 1975	Change in capacity, 1975–80
Alabama	3	+3	34,375	+107,330
Alaska	4	+0	66,050	+47,950
Arizona	1	0	4,000	+2,000
Arkansas	4	0	60,715	+4,485
California	36	+5	1,900,640	+605,730
Colorado	3	+5	60,000	−3,650
Delaware	1	0	140,000	.....
Florida	1	0	5,700	+7,300
Georgia	2	0	18,000	+4,750
Hawaii	2	0	85,000	+28,900
Illinois	11	0	1,168,150	+37,900
Indiana	8	0	563,275	+35,125
Kansas	11	0	447,180	+13,604
Kentucky	3	+1	164,000	+80,160
Louisiana	19	+11	1,729,575	+570,400
Maryland	2	0	26,500	+2,000
Michigan	6	0	149,082	−9,007
Minnesota	3	0	199,300	+18,643
Mississippi	5	+2	289,500	+59,350
Missouri	1	0	107,000	−3,000
Montana	8	−2	157,206	−3,306
Nebraska	1	0	5,000	+600
Nevada	.....	+1	.....	+4,275
New Hampshire	.....	+1	.....	+12,800
New Jersey	4	+1	539,000	+151,500
New Mexico	7	+2	103,061	+23,398
New York	2	+1	111,385	+29,465
North Carolina	.....	+1	.....	+11,900
North Dakota	3	0	58,658	+7,200
Ohio	7	0	589,770	+3,180
Oklahoma	12	0	499,815	+60,160
Oregon	1	0	14,000	+1,000
Pennsylvania	11	−1	757,020	+43,500
Rhode Island	1	−1	7,500	−7,500
Tennessee	1	0	43,900	−1,400
Texas	45	+11	3,929,430	+949,445
Utah	6	−2	143,000	+20,930
Virginia	1	0	53,000	.....
Washington	7	0	364,000	+20,400
West Virginia	3	0	19,750	+400
Wisconsin	1	0	45,000	−5,000
Wyoming	12	0	186,870	+12,520
United States	259	+38	14,845,407	+2,945,437

Source: Oil and Gas Journal, Annual Refining Surveys

TABLE 4.—CHANGES IN U.S. REFINERIES BY STATE, 1980 THROUGH 1984

	Number of refineries, 1980	Change in number, 1980–84	Crude capacity, B/CD 1980	Change in capacity, 1980–84
Alabama	6	−5	141,705	−61,705
Alaska	4	0	114,000	+24,930
Arizona	1	0	6,000	−1,000
Arkansas	4	0	65,200	+970
California	41	−11	2,506,370	−241,272
Colorado	3	0	56,350	+38,350
Delaware	1	0	140,000	
Florida	1	−1	13,000	−13,000
Georgia	2	0	22,750	+6,050
Hawaii	2	0	113,900	−4,400
Illinois	11	−3	1,206,050	−260,050
Indiana	8	−3	598,400	−167,100
Kansas	11	−4	460,784	−122,784
Kentucky	4	−2	244,160	−25,260
Louisiana	30	−14	2,299,975	−111,182
Maryland	2	−1	28,500	−14,300
Michigan	6	−2	140,075	−20,675
Minnesota	3	−1	217,943	−13,800
Mississippi	7	−2	348,850	+13,550
Missouri	1	−1	104,000	−104,000
Montana	6	0	153,900	−6,400
Nebraska	1	−1	5,600	−5,600
Nevada	1	0	4,275	+225
New Hampshire	1	−1	12,800	−12,800
New Jersey	5	0	690,500	−187,500
New Mexico	9	−6	126,459	−63,409
New York	3	−3	140,850	−140,850
North Carolina	1	−1	11,900	−11,900
North Dakota	3	−1	65,858	−3,058
Ohio	7	−2	592,950	−77,250
Oklahoma	12	−7	559,975	−185,975
Oregon	1	0	15,000	
Pennsylvania	10	−2	800,520	−141,820
Tennessee	1	0	42,500	+14,500
Texas	56	−23	4,878,875	−732,975
Utah	8	−2	163,930	−8,980
Virginia	1	0	53,000	−2,000
Washington	7	0	384,400	+26,150
West Virginia	3	−1	20,150	−3,650
Wisconsin	1	0	40,000	−1,000
Wyoming	12	−6	199,390	−36,612
United States	297	−106	17,790,844	−2,654,582

Source: Oil and Gas Journal, Annual Refining Surveys

Table 5 lists the inactive refineries in the United States in 1984 by location and size. Most of these are small, with capacity under 50,000 barrels per calendar day.

TABLE 5.—INACTIVE REFINERIES, AS OF JANUARY 1, 1985

Company	Location	Size, B/CD
Allied Materials Corp.	Stroud, OK	8,500
Caribou Four Corners Inc.	Woods Cross, UT	8,400
Celeron Oil & Gas Co.	Mermentau, LA	14,000
Champlin Petroleum Co.	Enid, OK	53,800
Dorchester Refining Co.	Mt. Pleasant, TX	26,500
Eco Petroleum Inc.	Signal Hill, CA	10,000
Eddy Refining Co.	Houston, TX	3,500

TABLE 5.—INACTIVE REFINERIES, AS OF JANUARY 1, 1985—Continued

Company	Location	Size, B/CD
Flint Chemical Co.	San Antonio, TX	1,400
Golden Eagle Refining Co.	Carson, CA	16,500
Hill Petroleum Co.	Krotz Springs, LA	48,000
Hunt Oil Co.	Tuscaloosa, AL	44,500
Independent Valley Energy Co.	Bakersfield, CA	28,000
Marlex Oil & Refining Inc.	Long Beach, CA	20,000
Mobile Bay Refining Co.	Chicasaw, AL	20,000
Natchez Refining Inc.	Natchez, MS	15,000
Oklahoma Refining Co.	Cyril, OK	9,200
Oklahoma Refining Co.	Thomas, OK	9,800
Paramount Petroleum Corp.	Paramount, CA	46,500
Port Petroleum Inc.	Stonewall, LA	3,200
Powerine Oil Co.	Santa Fe Springs, CA	44,120
Quintana Petrochemical Co.	Corpus Christi, TX	35,000
Southern Union Refining Co.	Lovington, NM	36,100
South Hampton Refining Co.	Silsbee, TX	19,000
Sunland Refining Corp.	Bakersfield, CA	15,000
Tesoro Petroleum Corp.	Carrizo Springs, TX	26,100
Thriftway Co.	Bloomfield, NM	6,515
Tonkawa Refining Co.	Arnett, OK	12,000
United Refining Co.	Warren PA	60,000
USA Petrochem Co.	Ventura, CA	27,900

Source: Oil and Gas Journal, March 18, 1985.

The complex pattern of growth and decline in refinery capacity since 1975 is fairly evident from Tables 3 and 4. Tables 6 and 7 show the complexity implicit in the on-going restructuring of the oil industry in the United States in greater detail. Table 6 shows the number of temporary refinery shutdowns during a *period of growth* in refining capacity, 1975–79. Refineries here are grouped by size and location in PAD (Petroleum Administration for Defense) Districts used by the Department of Energy (Figure 1). The majority of inactive refineries were small, with under 50,000 barrels per calendar day capacity. As might be expected, Table 7 shows a much higher number of refinery shutdowns, 106 throughout the United States, during the 1980–84 period. Again, 95 of these refineries were small and nearly one-third were located in the state of Texas. However, *Table 4 does show a decrease in refining capacity throughout the country since 1980 of nearly 2.7 million barrels per calendar day.*

TABLE 6.—REFINERY SHUTDOWNS BY PAD DISTRICT AND SIZE, 1975–79

PAD district	Refinery capacity (B/CD)			
	1–50,000	50,000–100,000	100,000	Total
I. Rhode Island	1			1
Pennsylvania	1			1
II. Indiana	2			2
Kansas	3	1		4
Oklahoma	1			1
III. Louisiana		1		1
Texas	5	1		6
IV. Colorado	2			2
Montana	3			3
Wyoming	1			1

TABLE 6.—REFINERY SHUTDOWNS BY PAD DISTRICT AND SIZE, 1975–79—Continued

PAD district	Refinery capacity (B/CD)			
	1–50,000	50,000–100,000	100,000	Total
V. Alaska	1			1
California	3		1	4
United States	23	3	1	27

Source: Compiled from Oil and Gas Journal various annual surveys

TABLE 7.—REFINERY SHUTDOWNS BY PAD DISTRICT AND SIZE, 1980 THROUGH 1984

PAD district	Refinery capacity (B/CD)			
	1–50,000	50,000–100,000	100,000	Total
I. N. Hampshire	1			1
New York	2	1		3
Maryland	1			1
Pennsylvania	2			2
Florida	1			1
N. Carolina	1			1
W. Virginia	1			1
II. Illinois	3			3
Indiana	2		1	3
Kansas	2	2		4
Kentucky	2			2
Michigan	2			2
Minnesota	1			1
Missouri			1	1
Nebraska	1			1
N. Dakota	1			1
Ohio	1	1		2
Oklahoma	6	1		7
III. Alabama	5			5
Louisiana	12	1	1	14
Mississippi	2			2
Texas	22	1		23
New Mexico	6			6
IV. Utah	2			2
Wyoming	6			6
V. California	10	1		11
United States	95	8	3	106

Source: Compiled from Annual Refining Surveys (Oil and Gas Journal), various years

Table 8 focuses on the Texas Gulf Coast area and shows the amount of restructuring going on in that region in the last five years. These data were compiled from a different source than previous tables, and activities in the chemical industry (SIC 28) are included as well as petroleum refining (SIC 29). During the last five years, when refining capacity declined in the country as a whole, we see that 23 petrochemical plants were downgraded in the Texas Gulf Coast region, downgrading implying partial or complete closure of operations. Texas petrochemical companies were also involved in 41 acquisitions and 16 joint ventures. But the greater activity *involved upgrading existing facilities,* i.e., on-site expansion of existing operations rather than building new plants. Along the

Texas coast, therefore, a large amount of upgrading of petrochemical facilities took place during the downturn in the refining sector.

TABLE 8.—*Restructuring in the Texas Gulf Coast Petro-Chemical Sectors, 1979–84*

	Cases
Acquisitions	41
Joint ventures	16
Upgrading (expansions, increased capacity)	114
Downgrading (partial or complete closure of operations)	23

Source: Compiled from Texas Industrial Expansion, Bureau of Business Research, University of Texas at Austin.

To cite one example of upgrading that involves the Texas Gulf Coast, Texaco in its 1983 *Annual Report* cites the Getty acquisition as part of a massive program to upgrade its worldwide manufacturing system. Since early 1981, in addition to eliminating excess and noncompetitive capacity, the company has been upgrading remaining capacity with $2.7 *billion* investment program that included ten major construction projects. In a 1983 speech to the Port Arthur Chamber of Commerce, the CEO of Texaco referred to an investment of over $2 billion in its Port Arthur refining complex since its inception (1902), the largest investment by the company in any of its individual locations.

Figure 1

Petroleum Administration for Defense (PAD) Districts

C. Impacts on the Shipbuilding Industry

In the 1970's, the domestic and worldwide oil industry expected the demand for oil to increase and geared up accordingly, partially in prospect of higher oil prices. Oil prices in the $40–$50 per barrel range were anticipated in the 1980's. Consequently orders were placed for more oil tankers, especially the very large crude carriers (VLCC's). VLCC's, by definition, are in the 200,000–400,000 deadweight tonnage (dwt.) classification while ultra large crude carriers (ULCC's) are larger than that. World seaborne trade in crude oil increased from approximately 550 million in 1960 to approximately 2,100 million tons in 1979 and then started a precipitous decline to approximately 1,350 million tons in 1982. What was *not* anticipated was the strong efforts by consumers everywhere—especially in the U.S.—to conserve energy and reduce oil consumption due to higher prices. OPEC and world crude oil prices reached the $34–$35 per barrel range and then were forced down by reduced demand.

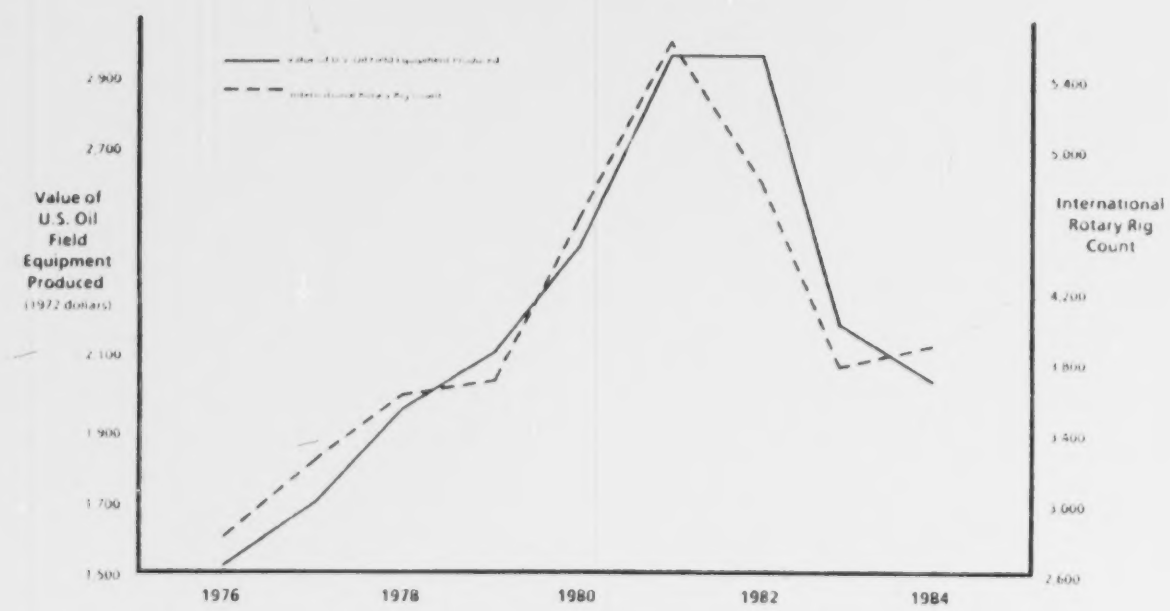
The reduced oil demand brought about two reactions in the shipbuilding industry—large numbers of ships were laid-up (placed in standby status), especially the very large crude oil carriers, and new crude oil carrier completions started to plummet with drastic effects on the shipbuilding industry. World ship tonnage in lay-up rose from about 5.5 million gross tons in 1980 to in excess of 45 million gross tons in 1982. Shipbuilding construction orders began to drop in 1973 from a level of about 100 million gross tons to about 10 million tons in 1977. The completion rate for crude oil tankers dropped from about 22 million gross tons in 1975 to about three million gross tons in 1982.

The effect of reduced oil demand on the U.S. shipbuilding industry (SIC 3731) was much less pronounced, primarily because U.S. merchant shipbuilders have not been competitive in the worldwide industry. U.S. shipbuilders' share of world commerical ship orders averaged less than five percent during the period from 1972 through 1982 and has decreased since then. Currently, the two countries receiving the largest share of new merchant shipbuilding orders are Japan and South Korea, capturing about 50 percent of the worldwide market. In 1985, the U.S. merchant shipbuilders' share of the world market is projected to be about 1–2 percent and about the same in 1990. Thus, the impact of the depressed oil industry, domestic and worldwide, on the U.S. shipbuilding industry has been minimal.

D. Recent Trends in the Oil Field Equipment Industry

It should come as no surprise that the performance of the U.S. oil field equipment industry has been and will be strongly affected by the level of drilling activity. As is shown in Figure 2, the recent decline in the real value of production in this industry coincides with worldwide drilling activity.

Figure 2
WORLD ROTARY RIG COUNT AND
U.S. REAL VALUE OF OIL FIELD EQUIPMENT PRODUCTION
1976 - 1984



Nevertheless, the future prospects for this industry in the U.S. are not solely dependent upon a firming of oil prices. Over the long term, U.S. producers face stiff competition in export markets. In the domestic market, drilling activity itself will be strongly impacted by proposed tax revisions.

There are only a handful of U.S. industries more dependent upon foreign markets than is the oil field drilling equipment industry. In 1982, 54 percent of the value of goods produced by U.S. firms in this industry was exported. On average, between 1978 and 1984, exports amounted to about 46 percent of total U.S. production.

Although a paucity of comparable international data prevents accurately gauging the U.S. market share of worldwide exports, estimates range upwards of 60 percent. Clearly the long term future of this industry in the U.S. is tied not only to the level of foreign drilling activity but also to our ability to remain competitive in foreign markets.

As an indicator of recent performance in this regard, Figure 3 presents the real value of the U.S. exports of oil field machinery per operating foreign rig. During the high drilling demand period of 1978 to 1982, the U.S. apparently increased its foreign market share or, given the inaccuracies in using the rig count as a true measure of demand, at least maintained its market share. Only with the joint influence of an increasingly competitive market (as a result of declining drilling activity) and the rising value of the dollar did U.S. firms apparently lose ground to foreign competitors in 1983 and 1984.

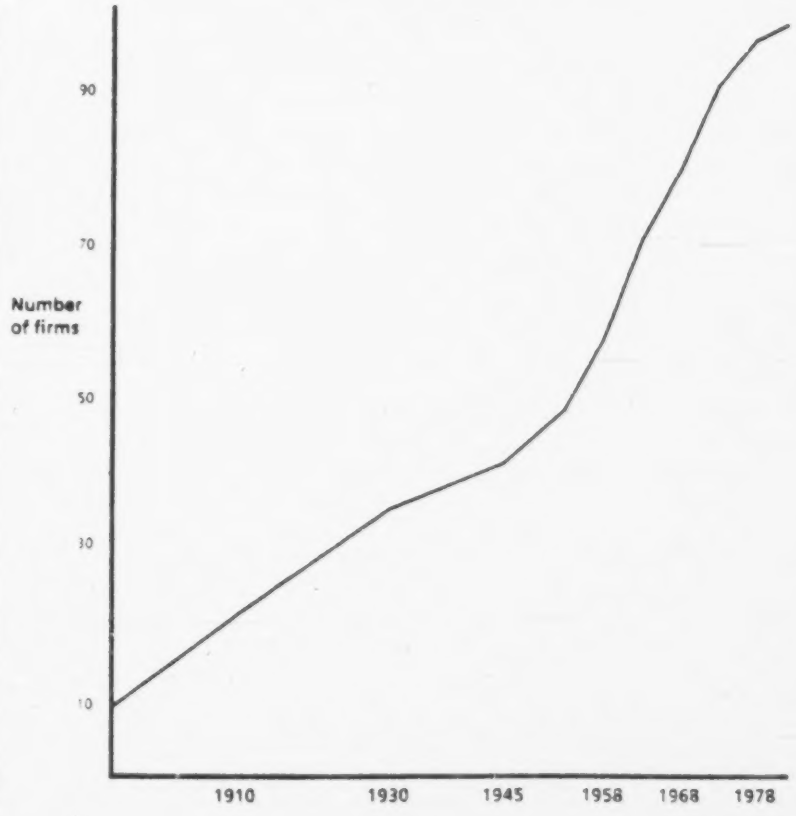
Figure 3
REAL VALUE OF OIL FIELD EQUIPMENT EXPORTS PER OPERATING FOREIGN ROTARY DRILLING RIG
1978-1984

Over the long term the key to retaining our competitive edge is technology. The oil field equipment produced in this country is "state-of-the-art." Moreover, as ever more inhospitable sites are drawn into production (off-shore, deep drilling, "Arctic" production) the need for higher technology goods will increase. Fortunately, a 1985 study by the U.S. International Trade Administration found no evidence of declining R&D expenditures during the recent decline in drilling activity.

Probably more than offsetting our high quality of goods produced and the likely increasing demand for state-of-the-art equipment is the increasing quality and quantity of foreign competition.

As a result of experience gained in North Sea exploration and production, it is generally agreed that in some areas of the oil field equipment industry (notably seismic surveying) French and British quality rivals our own. Moreover, as can be seen in Figure 4, the number of foreign competitors is rising. This trend is the result of both a desire to avoid the vagaries of currency fluctuations through the establishment of foreign subsidaries as well as from "local content" efforts of oil producing countries. Indeed, for the first time in its history, Saudi Arabia is demanding joint ownership of oil field service operations and wants foreign firms to make products like rock bits, valves, and oil field tools locally.

Figure 4
CUMULATIVE NUMBER OF
FOREIGN OIL FIELD EQUIPMENT MANUFACTURERS
BY YEAR OF FIRM FOUNDING*

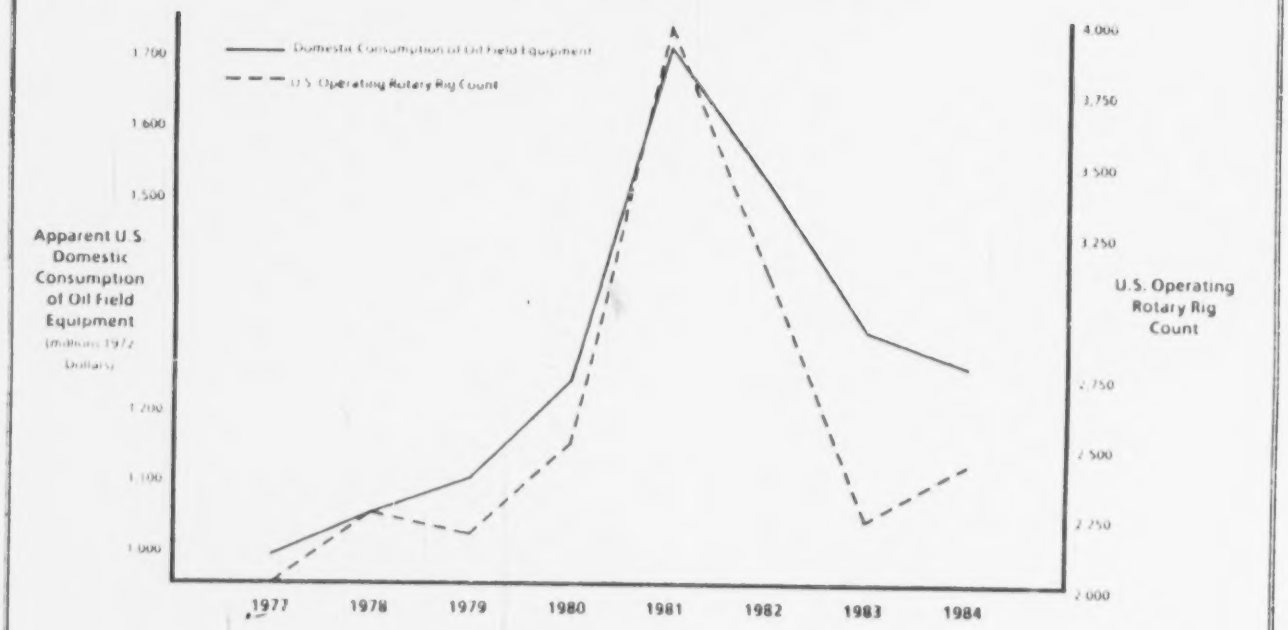


* Dun & Bradstreet listing of firms operating in 1983

In total, increasing quality and quantity of foreign competition will likely result in a slightly declining world market share for U.S. producers despite our current technological sophistication. Perhaps most importantly, domestic research and development activities *must be encouraged* to minimize these long term trends.

With rotary rig activity in the U.S. averaging about 60 percent of worldwide non-communist drilling activity, of roughly equal importance to the foreign market is the U.S. domestic market for oil well drilling equipment. Once again, as is shown in Figure 5, the driving force behind this market is U.S. drilling activity levels.

Figure 5
APPARENT U.S. DOMESTIC CONSUMPTION OF OIL FIELD EQUIPMENT*
AND OPERATING U.S. ROTARY DRILLING RIGS
1977-1984



* Apparent Domestic Consumption defined as total domestic product minus exports plus imports.

In the near term, it is likely that this drilling activity level will increase partially because the severe drop in 1983 may have been an overreaction. Additionally, according to James R. Moffett of Freeport-McMoRan, recent federal lease sales and merger activity may have temporarily depressed drilling activity in the U.S.

In May 1983, the Interior Department leased more than 2.5 million acres for oil exploration in five sales. The corporate energy spent on preparation for these sales may have drawn resources that would have otherwise been devoted to drilling. Moreover, and more or less coincident, oil company merger activity created additional uncertainty.

While it is difficult to quantify the exact magnitude of the effect these factors may have and are having on drilling activity and on the subsequent demand for oil field drilling equipment, the sum total undoubtedly pales in comparison to the likely impact of changes in U.S. tax policy.

The two leading congressional tax reform proposals, as well as the Treasury Department reform package, include repeal of percentage depletion allowances and current expensing of intangible drilling costs. Industry estimates project the net impact of such changes would send the U.S. active rig count to under 1,900. Based on historical rig count-oil field machinery manufacturing employment levels, this could reduce employment in the industry by about 8,500 jobs, 65 percent of which would be lost in Texas.

III. THE UNDERLYING CAUSES OF STRUCTURAL ADJUSTMENT IN THE DOMESTIC OIL INDUSTRY

The causes of structural change in the domestic oil industry are several and complex. For the most part, however, recent changes in the industry may be attributed largely to two forces that influence both producers and refiners: (1) changing international and domestic supply-demand relationships and (2) domestic public policy decisions. The more important influence has been, and will continue to be, the marketplace; that is, the changing nature of supply and demand for crude oil and refined products. The consequences of a changing oil industry for the Gulf Coast economy are simply a local playing-out of events that are precipitated elsewhere.

A. Structural Change in Domestic Oil Production

The major influence on domestic oil production is the rapidly changing international supply and demand relationship for crude oil. A number of factors influence this relationship, including domestic and foreign government policies. Beyond any doubt, however, the greatest influence is the international market price for crude oil—the OPEC "benchmark price" or the price for "Saudi Light."

The OPEC benchmark price has been on a roller-coaster ride during the past decade. From 1976 until 1981, the benchmark price rose sharply to a peak of approximately $35 per barrel, but since 1981 the price has fallen almost as sharply to just over $27 per barrel with some analysts forecasting a further decline to perhaps $20 per barrel. The steady increase in the benchmark price until 1981 is a reflection largely of OPEC's success in restricting the supply of crude oil allowed into the market. Conversely, the rapid decline in the benchmark price since 1981 reflects the cartel's increasing lack of control over world oil supplies and, hence, prices.

Although rising oil prices throughout the last half of the 1970's were harmful to the national economy as a whole, they were a tremendous stimulus to those states with substantial oil reserves, notably Texas, Louisiana, Oklahoma, Alaska and California. In short, rising oil prices, which made exploration and production in those states more profitable, encouraged a flurry of drilling activity. Between 1978 and 1981, for example, the number of active drilling rigs nationwide increased by almost 1,000 percent, while real capital outlays for exploration and drilling more than doubled. The federal government's decision to deregulate oil prices contributed to this surge of activity, of course, but the major influence was the rapid increase in the benchmark price.

It is useful at this point to distinguish between the short- and long-term influences of oil prices since the former involves something that is known and the latter concerns expectations. While

short-term profitability is affected most directly by short-term fluctuations in the benchmark price, decisions concerning the investment of capital resources in drilling and exploration are influenced more strongly by the anticipated long-term *trend* in prices. Upon the recommendation of many industry analysts and economists, enormous capital resources were committed to exploration and production during the late 1970's in the expectation that oil prices would continue to rise indefinitely. This expectation also fueled rapid growth in drilling-related manufacturing industries that produce oil field equipment, drilling rigs and process control instruments. As other sections of this report note, a large proportion of Gulf Coast manufacturing employment is concentrated in such industries.

But rising oil prices in the late 1970's also encouraged substantial exploration and drilling outside the United States, particularly in the North Sea where the United Kingdom, Norway and the Netherlands developed large offshore fields. Similarly, the OPEC nations continued to expand their production and many other developing nations, China for instance, turned to exploration and drilling to enhance their meager foreign currency earnings. As more nations became oil producers, and as the supply of crude oil in the world market increased, OPEC's ability to restrict supply and thereby maintain comparatively high oil prices became increasingly limited. Indeed, by 1982 the world market was glutted with oil, and prices began to tumble as non-OPEC producers began to sell their crude oil at prices well below the OPEC benchmark.

The impact of falling oil prices on domestic exploration and drilling has been dramatic since it essentially entails the progression of the industry from a "regulated" (in the sense of OPEC price fixing) to a "deregulated" market. Regulated markets generally encourage the survival of marginal producers since otherwise prohibitive production costs may be passed on to consumers through the "fixed" price. Deregulated markets, conversely, will tend toward efficiency as downward price movements drive marginal producers out of the industry. This has been the case in domestic exploration and drilling. Many American producers, particularly offshore producers, are "marginal" in the sense that their production costs are relatively high in comparison to foreign producers and prohibitive in a deregulated market. Evidence of this is found in the fact that domestic drilling activity has returned to its 1978 level and real capital expenditures have declined by almost thirty percent.

B. Structural Change in Domestic Refining

As with exploration and drilling, domestic refining is undergoing structural change precipitated largely by the changing market for refined products. On the supply side, domestic refiners have been buffeted by increasing offshore competition, while on the demand side, consumer purchases of refined products have been shrinking.

During the late 1970's, domestic refiners made substantial capital investments to expand their capacity. As with investments in exploration and drilling, these expenditures were made largely on the assumptions that crude oil prices would continue to increase and, most importantly, that the demand for refined products would

increase despite increases in their price. The latter assumption was based on insufficient evidence that appeared to suggest that the demand for refined products was highly inelastic; that is, that increases in price would not significantly affect the demand for products.

But increasing oil prices also encouraged the construction of refining capacity in oil-producing developing nations. During the late 1970's, OPEC nations in the Middle East and North Africa embarked on efforts to develop integrated oil industries—industries that produce and process crude oil. In every instance, these nations sought to increase their foreign currency earnings by entering, and eventually capturing, a share of the market for refined products. The quest for foreign currency earnings, especially U.S. dollars, as a stimulus to the growth of offshore refinery capacity cannot be overstated. For developing nations, foreign currency earnings are a critical source of finance for development projects. Having raised the expectations of their populations, many governments not unwisely perceive such earnings as the key to their survival.

Although little of the planned capacity has become operational as yet, a considerable impact will be felt over the next three years. Because this capacity is newer, it is highly automated and, therefore, less labor-intensive. Automated refineries abroad possess a critical advantage over American refiners, whose labor costs are increasingly the only variable cost over which control may be exercised. Moreover, because of the political constraints mentioned above, many developing nations are fully prepared to input raw materials to their refineries at below cost in order to maintain operations at fully capacity.

Some measure of the potential impact of this new capacity may be gained from the beating American refiners have taken over the past five years from refiners in Western Europe and the Caribbean. Almost 50 percent of the demand for refined products is for gasoline, and domestic gasoline imports from those regions have grown on an annual basis from about four percent of domestic consumption in 1981 to about seven percent in 1984. In recent months, gasoline imports have exceeded 11 percent of domestic consumption. Some of this increase can be attributed to the strength of the dollar. But for the most part, the increasing lack of competitiveness on the part of American refiners is attributable to a loss of comparative advantage. It is simply more expensive to produce gasoline in this country than elsewhere. Domestic refineries are comparatively old and labor-intensive.

The increasing competition in the manufacture of refined products has been heightened by the declining domestic demand for refined products, principally gasoline. In other words, more refiners are competing for a smaller market. Contrary to expectations, higher oil and refined product prices *did* discourage demand, largely through conservation. In fact, many industry analysts predict the demand for gasoline to be as much as 25 percent below the 1984 level by 2000.

IV. EMPLOYMENT CONSEQUENCES FROM THE RESTRUCTURING OF THE OIL INDUSTRY

During the 1970's, the oil patch, and especially the Texas-Louisiana Gulf Coast Crescent, experienced an unprecedented economic boom. Driven by constantly rising prices for oil and gas, the regional economy posted extremely rapid employment and income gains as a result of increased exploration and drilling activity, the manufacture of oil field equipment, expansions at refineries and chemical plants and the relocation of energy company offices to the Gulf Coast.

For the past three years, by contrast, the Gulf Coast economy has been in a tailspin. Job growth has slowed markedly in all of the region's metropolitan areas, and unemployment rates, for the most part, remain well above the U.S. average despite two and a half years of national economic recovery and expansion. Most significantly, *every metropolitan area along the Gulf Coast has experienced large declines in manufacturing employment since 1980,* with losses ranging from 4.8 percent in Lafayette to 33.3 percent in Lake Charles (see Table 9).

The table shows that the Beaumont-Port Arthur MSA has suffered declines in both total non-agricultural and manufacturing employment. Houston and Victoria MSA's have also suffered significant declines in manufacturing employment while Galveston-Texas City and Corpus Christi have not fared as badly as the other three MSA's; but all five MSA's lost manufacturing employment. Aside from Beaumont-Port Arthur, the other Texas Gulf Coast MSA's listed posted small increases in total non-agricultural employment since 1977. It should also be noted that the Lake Charles, La., MSA, whose economy is similar to the Beaumont-Port Arthur MSA, suffered much higher employment losses than this area.

TABLE 9.—EMPLOYMENT DATA, GULF COAST MSA's

	Thousands						Percent change 1980–December 1984	
	1977		1980		December 1984			
	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing
Texas:								
Beaumont-Port Arthur	142.8	40.0	148.7	38.5	141.0	30.5	−5.2	−20.8
Houston	1,173.6	195.1	1,439.3	240.2	1,539.7	197.2	7.0	−17.9
Galveston-Texas City	65.3	11.9	70.3	11.4	72.0	10.1	2.4	−11.4
Victoria	NA	NA	27.1	3.5	28.4	2.9	4.8	−17.1
Corpus Christi	104.3	13.1	124.7	16.1	131.0	14.7	5.1	−8.7
Louisiana:								
Lake Charles	54.0	11.3	66.3	13.5	58.0	9.0	−12.5	−33.3
Lafayette	58.1	3.2	78.8	4.2	90.4	4.0	14.7	−4.8
Baton Rouge	176.6	23.8	203.9	25.9	214.8	22.2	5.3	−14.3

TABLE 9.—EMPLOYMENT DATA, GULF COAST MSA's—Continued

	Thousands						Percent change 1980–December 1984	
	1977		1980		December 1984			
	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing	Total nonagricultural	Manufacturing
New Orleans	455.5	51.2	499.4	53.5	506.9	40.2	1.5	−24.9

Sources: Supplement to Employment and Earnings, States and Areas, Data for 1977–80, Bureau of Labor Statistics, September 1981; Louisiana Department of Labor; Texas Employment Commission.

A. The Golden Triangle

Manufacturing employment in the Golden Triangle (Beaumont-Port Arthur MSA) decreased by 32 percent from December 1981 through December 1984 in the 42 companies included in the John Gray Institute semi-annual employment survey. Texas Employment Commission statistics for total manufacturing employment in this MSA reflect a 29 percent decline for the same period. Table 10 shows the employment trends in the surveyed firms aggregated by geographic area and industrial sector.

TABLE 10.—EMPLOYMENT TRENDS IN THE GOLDEN TRIANGLE

	Number of firms, December 1984	December				December 1981–December 1984 jobs lost	
		1981	1982	1983	1984	Number	Percent
I. Geographic area:							
Beaumont	18	13,930	10,896	10,887	10,715	3,215	23.1
Orange	8	8,535	5,049	4,589	4,660	3,875	45.4
Port Arthur	7	11,391	9,353	7,858	6,772	4,619	40.5
Mid-Jefferson Co.	6	3,365	3,087	2,842	2,716	649	19.3
Silsbee	3	2,172	2,078	1,901	1,895	277	12.8
Total	42	39,393	30,463	28,077	26,758	12,635	32.1
II. Industrial sector:							
Oil refining/related activities	8	13,087	11,528	10,371	9,065	4,022	30.7
Petrochemicals	16	10,751	9,998	9,353	9,002	1,749	16.3
Offshore services	5	3,075	812	555	951	2,124	69.1
Ship repair/rig fabrication	3	5,840	1,594	1,343	1,378	4,462	76.4
Paper/forest products	4	2,782	2,730	2,686	2,607	175	6.3
Others	6	3,858	3,801	3,769	3,755	103	2.7
Total	42	39,393	30,463	28,077	26,758	12,635	32.1

Source: John Gray Institute survey.

Employment decline in these surveyed companies cannot all be attributed to structural change in the oil industry obviously. The nation underwent a major recession in 1981–82 which had a significant impact locally. Falling crude oil prices and uncertainty about future prices had a major impact on the Offshore Services and Ship Repair/Rig Fabrication industrial sectors as oil explorations activities in the Gulf of Mexico declined in 1983. The shipbuilding and repair industry (SIC 3731) has been in a depression worldwide for the past several years. These two industrial sectors of the area economy have lost 69.1 and 76.4 percent, respectively, of their De-

cember 1981 employment. The Oil Refining/Related Activities industrial sector lost 30.7 percent of its December 1981 employment. The Institute anticipates that the employment decline in the area oil industry will not be recovered in the near future. It would expect the same result in the Offshore Services and Ship Repair/Rig Fabrication sectors. The Petrochemicals industry sector lost 16.3 percent of its December 1981 employment in the last three years, but this was not caused by oil industry structural change.

A review of current economic conditions in the Beaumont-Port Arthur metropolitan area yields other interesting results. Between 1970 and 1980, the Golden Triangle's population growth rate of 8.0 percent was the third lowest of the state's 26 metropolitan statistical areas (MSA's). Furthermore, the area grew more slowly than any other medium-sized metropolitan area in the entire Sunbelt during the 1970's. Between the 1980 census (April 1980) and July 1, 1982, the Golden Triangle grew by more than 12,000 persons, or 3.3 percent; but this growth rate was the fifth lowest of the state's metropolitan areas.

Though population and employment growth have been weak over the past 10–12 years, personal income growth has remained strong, matching or exceeding the national average. Both per capita income and median family income in the Beaumont-Port Arthur MSA were well above the statewide averages in 1980, and the area's poverty rate, according to the 1980 census, was more than two percentage points *below* the state rate. As a result of strong income growth, retail sales in the Golden Triangle also have posted substantial gains over the past twelve years.

The future outlook is less than rosy for the Golden Triangle. Most of the area's refineries and petrochemical plants are operating well below capacity, and return to full production is not anticipated given the worldwide glut of oil and feedstocks. Furthermore, petrochemical production is moving increasingly offshore, suggesting there will be little or no new construction in the Beaumont-Port Authur MSA and elsewhere in this industry. As a result of a 40 pecent decline in the number of active drilling rigs in the state since December 1981, the demand for drilling machinery, pipe and oil field services has dropped, thereby substantially affecting many firms in the metropolitan area. Other major industries in the Golden Triangle, such as steel, rubber and shipbuilding, are also in secular decline.

B. Galveston-Texas City

A review of economic conditions in the Galveston-Texas City metropolitan area shows that between 1970 and 1980, Galveston County's population growth rate of 15.4 percent was the seventh lowest of the state's metropolitan areas (MSA's). Between the 1980 census (April 1980) and July 1, 1982, the metropolitan area grew by about 12,000 persons, or six percent. This growth rate was the eleventh lowest of the state's metropolitan areas.

The Galveston-Texas City metropolitan area has exceeded state and national averages for per capita personal and median family income since 1979. One of the fastest growing cities in the area since 1970, Friendswood, reported median family income that was

about 67 percent higher than the state or national average in 1979. The metropolitan area's poverty rate in 1979 was 28 percent below the state average. As a result of strong income growth, retail sales in the Galveston metropolitan area have posted very substantial gains over the past twelve years.

The economic outlook for the Galveston-Texas City metropolitan area may not match the state growth. Two of the area's major manufacturing industries, petrochemicals and petroleum refineries, are not likely to expand. Another significant industry in the area, construction, is also not likely to expand without growth in the petrochemical and refining sectors. The health and education services sector of the area's economy has experienced significant growth in the past three years and, along with the growth of tourism in Galveston, could provide employment stability to the metropolitan area.

C. Houston

The Institute finds that the Greater Houston economy probably possesses considerably less vitality than it had in 1980, despite such positive signs as increased non-agricultural employment. This conclusion stems, in part, from the substantially diminished rates of population and income growth displayed by Greater Houston since 1980 and, more importantly, from the fact that the area's net employment gains have occurred in comparatively low-wage service industries and tend to mask substantial high-wage job losses in manufacturing and construction.

The manufacturing sector generally "drives" an economy through the comparatively high wages its workers receive and through its propensity to create jobs in other sectors of the economy. In the presence of a thriving manufacturing sector, the other sectors of an economy will tend to take care of themselves. Conversely, non-manufacturing sectors rarely have the strength to revive and sustain an economy characterized by a declining manufacturing sector. Many of Greater Houston's recent economic ills may be either directly or indirectly traced to a manufacturing sector that is overly concentrated in energy-related industries. To this extent, the importance of manufacturing to the area's economy deserves more emphasis since the wages received by energy industry workers are generally significantly higher than is the case in other manufacturing industries, while the "job-creation" effect is probably much greater as well. Through the changes in Greater Houston's manufacturing employment base that have occurred over the past four years, the area's economy is being permanently transformed by long-term structural changes and not simply temporarily depressed by short-term cyclical forces. A major objective of Greater Houston's economic development community should be to revitalize the area's manufacturing sector so that growth in non-industrial sectors may be sustained.

Greater Houston is an integral part of a larger, energy-based, regional economy experiencing structural change and vastly different from the more diversified, rapidly growing, metropolitan economies of North and Central Texas.

D. Victoria

Victoria is the newest and smallest metropolitan statistical area (MSA) in Texas. In the 1970's, the Victoria area population growth rate (28.0 percent) slightly exceeded that for Texas. Since 1980, population growth has also slightly exceeded the statewide average. From the 1980 census until July 1982 the growth rate of the area (5.9 percent) was the tenth slowest of the 26 MSA's in Texas.

The Victoria MSA has exceeded the state and national averages for per capita and median family income since 1979. Also, the growth rate for these two significant measurements has exceeded that for both Texas and the nation for the 1969–79 period. The metropolitan area's poverty rate in 1979 was lower than that for Texas but slightly higher than the U.S. level. The healthy per capita and median family income growth rates helped support significant gains in retail trade sales in recent years, exceeding the statewide growth rate.

Employment growth in the Victoria MSA should be moderately healthy for the balance of the 1980's since the service sector's percentage of the total for the area economy match those of the state in general. The manufacturing sector, which may not grow as rapidly as the service sector, is a lower percentage of the metropolitan area's economy than that found statewide.

E. Corpus Christi

A study of economic conditions in the Corpus Christi metropolitan area reveals among other things that, between 1970 and 1980, the area's population growth rate of 14.5 percent was the fifth lowest of the state's metropolitan statistical areas (MSA's). Between the 1980 census (April 1980) and July 1, 1982, the metropolitan area grew by about 18,000 persons, or 5.5 percent. This growth rate was the ninth lowest of the state's metropolitan areas.

The Corpus Christi metropolitan area has not matched state and national averages for per capita personal and median family income since 1969. The metropolitan area's poverty rate in 1979 was 16 percent above the state average and 36 percent above the national average. However, as a result of strong income growth rate since 1969, retail sales in the metropolitan area have posted substantial gains in recent years, essentially matching the state's growth rate.

The future for the Corpus Christi metropolitan area may also not match the state growth. Two of the area's major manufacturing industries, petrochemicals and petroleum refineries, are not likely to expand. Another significant industry in the area, construction, is also not likely to expand without growth in the petrochemical and refining sectors. The services and miscellaneous sector of the area's economy has experienced significant growth in the past three years and, along with the growth of tourism in Corpus Christi, could provide employment stability to the metropolitan area.

The five Texas Gulf Coast MSA's included in this study have had variable unemployment rates, as noted in Table 11. It can be seen that the Beaumont-Port Arthur and Galveston-Texas City MSA's endured higher peak unemployment levels than the other three and have not reduced their rates as much as the others.

TABLE 11.—ACTUAL UNEMPLOYMENT STATISTICS

MSA	Recent peak and date	January 1985 (percent)
Beaumont-Port Arthur	15.4 percent, February 1983	13.0
Galveston-Texas City	14.3 percent, February 1983	12.0
Houston	10.1 percent, June and September 1983	7.3
Victoria	11.1 percent, June 1983	6.2
Corpus Christi	12.2 percent, June 1983	9.0

Source: Texas Employment Commission

F. Lake Charles

Since 1980, approximately 5,000 high-wage industrial jobs have disappeared from the Lake Charles economy, primarily in petrochemicals, refining and construction. Though some of these job losses are cyclical in nature, most are a consequence of long-term structural adjustment in the energy sector. Moreover, the loss of purchasing power accompanying these industrial job losses has had an adverse effect on retail trade where over 1,500 jobs have been lost since 1982.

As the national economy continues to expand through 1985, steady employment growth should resume for most of Louisiana. But the outlook is less than rosy for Lake Charles. The area's petrochemical plants and refineries are operating well below capacity, and a return to full production is highly unlikely given the worldwide glut of oil and feedstocks, emerging offshore competition and the strong dollar.

G. Lafayette

Lafayette, although dependent on energy, has suffered less than most metropolitan areas along the Gulf Coast. Despite substantial job losses in oil and gas extraction, oil field equipment manufacturing and the offshore workboat fleet, Lafayette actually gained in total non-agricultural employment over the past five years. Retail trade in particular has shown strength, reflecting an economic base that is somewhat more diversified than is commonly the case in other Gulf Coast metropolitan areas.

Still, Lafayette's industrial sector remains disproportionately concentrated in oil and gas extraction. Recovery in this sector will proceed very slowly given the low market price for crude oil.

H. Baton Rouge

Employment growth in Baton Rouge, though healthy through the 1970's, has lagged behind the nation and the rest of the State of Louisiana in recent years. This job growth slowdown is a reflection of the profound changes the Baton Rouge economy has experienced over the past four years: substantial job losses in manufacturing and construction coupled with substantial job gains in services and trade. Gains in comparatively lower paying service and retail trade jobs cannot be considered adequate substitutes for comparatively high paying jobs lost in manufacturing and construction,

and although Baton Rouge has experienced a net gain in non-agricultural employment over the past four years, it has also suffered a considerable loss of purchasing power and vitality.

Baton Rouge's industrial job losses, as in other Gulf Coast metropolitan areas, have occurred primarily in refining, petrochemicals and contract construction.

V. OIL REFINING AND THE OUTLOOK FOR THE GULF COAST ECONOMY

The U.S. refining industry is not going out of business, but it is changing its product mix and its modus operandi. In the future, emphasis will be placed on products with a higher value-added than gasoline, such as lubricating base oils and petrochemical feedstocks. This product realignment will be accompanied by new investments in process-control technology, automation and energy conservation. As a result, the refineries of tomorrow will be manned with many fewer employees than the refineries of today.

Over the past three years, employment in refining nationwide has dropped over 13 percent, from 173,000 to 150,000. By the end of the century, the industry will probably employ fewer than 100,000 workers. The implication of these trends for Gulf Coast communities heavily dependent on the petrochemical sector should be crystal clear. Industrial diversification has become an imperative for economic survival.

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